

REMARKS

Claims 1-13 were pending in this application. Claims 1-13 have been rejected (claims 4-8 were said to present subject matter that would be allowable if the claims were suitably rewritten in independent form). Claims 1 and 2 have been cancelled. The specification and claims 3-5 and 9-13 have been amended. Claims 4 and 11-13 are independent.

The Examiner is thanked for the indicated allowability of claims 4-8. Claim 4 has been placed into independent form as the Examiner suggested, and so is believed to be allowable (claims 5-8 all ultimately depend from claim 4, and so need not themselves be placed into independent form). Also, claims 11-13 have been revised to include features corresponding to the features of claim 4 that the Examiner said were allowable.

The specification has been revised to correct a minor typographical error; "hick" has been changed to --thick--.

The Objection to the Claims

Claims 10 was objected to because of a minor typographical error; the Examiner noted that the term "he" at line 4 should be changed to --the--.

The Examiner is thanked for calling attention to this point. Claim 10 has been revised as the Examiner suggested.

Favorable reconsideration and withdrawal of this objection are respectfully requested.

**The Rejection Under
35 U.S.C. § 112, ¶ 2**

Claims 1-13 have been rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter of Applicants' invention.

The cancellation of claims 1 and 2 renders moot the corresponding portions of this rejection.

Since claim 4 now includes the features of claim 1, Applicants will, in the interest of expediting prosecution, address the rejections of claim 1 in the context of claim 4.

Claim 1 was rejected on grounds it was not clear what the "phenomenon" and "status" were.

The term "phenomenon" has been eliminated, and claim 4 now provides for a detector module that senses energy released from a discharge of a piezoelectric element to detect a property of the printing material. This aspect of the invention is clearly described in the specification.

The term "status" has been changed to --property--, and so the claimed subject matter is clear, especially in view of the disclosure at paragraphs [0032], which explains how residual ink quantity can be detected, and [0040], which states that properties such as the residual quantity of ink, temperature, humidity, density, mass, viscosity and pressure also could be detected.

With regard to claims 1 and 11-13, the Office Action questioned how the "detector module" and "driving circuit" correspond to the preferred embodiments and drawings. These features are clear in view of Figs. 2 and 3, and the corresponding portions of the

disclosure. Fig. 2 depicts the structure of an ink cartridge, including a residual ink quantity detector 230, which receives energy released by sensor SS to detect the status of the ink. At paragraph [0021] the specification mentions that a detection signal is transmitted to the residual ink quantity detector 230 to detect the ink level.

Fig. 3 depicts the circuit structure of the residual ink quantity detector. Paragraphs [0023]-[0028] describe how this structure drives the residual ink quantity detector. In particular, it should be noted that Fig. 3 depicts transistors Tr2 and Tr1, which the specification explains are involved with the discharge and supply operations.

In view of these portions of the specification, the meanings of the detector module and driving circuit are clear.

Claim 4 was rejected on grounds the term "electric power suppliable per unit time" was unclear. Claim 4 has been revised to avoid this language and to instead provide that the electric power output by the power supply unit is less than the electric power output by the piezoelectric element (since power is a measure of an amount of energy transferred over time, the reference to time itself has been eliminated)¹.

Claim 5 was rejected on grounds it was unclear if the term "power supplier" was an additional "supplier", or referred to the previously claimed "supply unit" in prior claim 4.

First, it should be noted claim 5 states "said power supply unit comprises: . . . an electric power supplier". So claim 5 is further defining the power supply unit.

¹ In the interests of clarity Applicant wishes to point out that with regard to the electric power suppliable per unit time, it is DC current that is supplied to a circuit, as the Examiner notes. The act of charging a discharging condenser is the transient response, and the energy suppliable per unit time would depend upon the circuit time constant.

In view of Figs. 2 and 3 and the corresponding portions of the disclosure it will be appreciated that the claimed power supplier corresponds to the sensor driving voltage generator 220, and the claimed electric power generator corresponds to the electric power generator 240, which are both shown in Fig. 2. Together these components are part of the power supply unit.

Claims 12 and 13 were rejected on grounds it was unclear how the terms "supplies circuit", "discharge circuit" and "detector module" read on the preferred embodiment or were shown in the drawings.

First, it should be noted the Office Action is in error insofar as it refers to the term "supplies circuit"; the claims use the term "supply circuit". Also, only claim 12 uses the term "detector module"; claim 13 refers to a "detection element".

As noted above with regard to claims 1 and 4, the supply and discharge circuits are shown in Fig. 3 and described at paragraphs [0023]-[0028]. The specification explains how transistors Tr2 and Tr1 shown in Fig. 3 are involved with the discharge and supply operations, and so the claimed supply and discharge circuits are clear.

As for the claimed detection module, such a module is shown in Figs. 2 and 3 and is mentioned at paragraph [0019] and is described in detail at paragraphs [0024]-[0029].

With reference to Fig. 3, it will be understood by those skilled in the art that the supply circuit corresponds to the sensor driving voltage generator, input TA, transistor Tr1 and resistor R1, while the discharge circuit corresponds to the input TB, transistor Tr2 and resistor R2. The detector module corresponds to the sensor SS, amplifier 232, comparator 234, counter controller 236 and counter 238.

Consequently, these features of claims 12 and 13 are clear.

Of course, the foregoing reading of claim features on the disclosure is by way of example only, and not limitation - the claims should not be limited to such exemplary arrangements.

In summary, it is respectfully submitted that all of the pending claims are definite in accordance with M.P.E.P. § 2173.01 ("Claim Terminology"), which provides in pertinent part:

The essential inquiry pertaining to this requirement is whether the claims set out and circumscribe a particular subject matter with a reasonable degree of clarity and particularity. Definiteness of claim language must be analyzed, not in a vacuum, but in light of:

- (A) The content of the particular application disclosure;
- (B) The teachings of the prior art; and
- (C) The claim interpretation that would be given by one possessing the ordinary level of skill in the pertinent art at the time the invention was made.

In reviewing a claim for compliance with 35 U.S.C. 112, second paragraph, the examiner must consider the claim as a whole to determine whether the claim apprises one of ordinary skill in the art of its scope and, therefore, serves the notice function required by 35 U.S.C. 112, second paragraph, by providing clear warning to others as to what constitutes infringement of the patent (citations omitted)

Taking into account both the claim changes and remarks discussed above, it is respectfully submitted that one skilled in the art having in mind the teachings of the prior art and the application disclosure would find all of the claims pending in this application to be sufficiently clear and definite. Accordingly, the pending claims are all definite in accordance with 35 U.S.C. § 112, second paragraph.

Favorable reconsideration and withdrawal of this rejection are respectfully requested.

**The Rejections Under
35 U.S.C. § 102**

Claims 1-3 and 9-13 have been rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,500,657 to Yauchi et al. Applicants respectfully traverse this rejection, and submit the following arguments in support thereof.

In conclusion, one skilled in the art would not

Claims 1-3 have been cancelled, rendering the corresponding portion of this rejection moot.

Claims 9 and 10 both now depend from claim 4, which has been placed into independent form, and which was said to distinguish over Yauchi. Claims 9 and 10 therefore also avoid the cited reference.

Claims 11-13 include features corresponding to the subject matter of allowable claim 4 that the Examiner at page 4 of the Office Action stated avoid Yauchi. Claims 11-13 therefore avoid the cited art at least for the same reasons as claim 4.

For all the foregoing reasons, favorable reconsideration and withdrawal of this rejection are respectfully requested.

CONCLUSION

All outstanding objections and rejections are either moot or have been overcome. Favorable consideration and prompt allowance of this application are respectfully requested.

Other than the extension fee authorized in the accompanying Petition for Extension of Time, no fees are presently believed to be due in connection with the filing of this paper. If, however, any fees are deemed to be now or hereafter due in connection with this application, the Commissioner is authorized to charge all such fees to Deposit Account No. 19-4709.

In the event that there are any questions, or should additional information be required, please contact applicant's attorney at the number listed below.

Respectfully submitted,

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